AMERICAN MUSEUM NOVITATES

Published by
Number 1155 THE AMERICAN MUSEUM OF NATURAL HISTORY December 31, 1941
New York City

MOUNTED SKELETON AND RESTORATION OF AN EARLY PALEOCENE MAMMAL

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In 1913 Dr. Walter Granger found and collected a skeleton of *Ectoconus* in the lower fossil level of the Puerco Formation of Kimbetoh Arroyo, San Juan Basin, New Mexico, that is still, as far as we know, the only nearly complete mammal skeleton ever found in Lower Paleocene strata. Since it is not only from the oldest known mammal-bearing Paleocene formation but also from its lowest fossiliferous stratum, this animal is a member of the earliest Tertiary fauna and the mount recently completed is much the oldest mounted mammal skeleton in any museum.

The late Dr. W. D. Matthew made this skeleton the type of *Ectoconus majusculus* Matthew, 1937, in his great posthumous publication on the San Juan Basin Paleocene.[1] There is some reason to believe that Matthew had misgivings about this species and he considered, but tentatively rejected, the possibility of its being based on a robust male of *E. ditrigonus*. From a cursory review of the problem, with additional specimens (68 in all were examined), I think this more likely than not. The problem merits more detailed attention, as do many anomalous cases of supposedly distinct but intergrading species found together (and, on the other hand, of supposedly identical species found in widely different strata and localities), but for the present we are retaining Matthew's nomenclature for this specimen. According to identifications made or let stand[2] by Matthew, the distribution of the 51 specimens known to him was as follows (all in the true Puerco):

	Lower level	Upper level	Totals with good records	Unknown level, in part doubtfully identified	Row totals
E. ditrigonus	7	2	9	34	43
E. majusculus	5	1	6	2	8
Column totals	12	3	15	36	51

The bones of the skeleton here in question were kept separate for study and illustration until after the publication of Matthew's memoir, but they have now (completed April, 1941) been restored and mounted by Mr. Charles Lang, under the general supervision of Dr. Walter Granger, Dr. Edwin H. Colbert, and me. A life restoration of the animal alone, in pencil, and a larger, colored, habitat restoration in oils have been made by Mr. John C. Germann, under the same auspices.

Matthew's description of the skeleton and illustrations of its separate bones are so accurate and complete that further details are unnecessary. Despite its very great age and some crushing, the skeleton is remarkably complete. The only considerable parts missing are the lower jaw, spines of the vertebrae, possibly two lumbars, most of the caudals, pelvis, and much of the left scapula and left femur. For the most part these could be well restored from the other side of the same individual or from other specimens of the same species, leaving only the heights of the vertebral spines and the exact form of the pelvis subject to any serious doubt. Compari-

[1] Matthew, W. D., 1937, "Paleocene faunas of the San Juan Basin, New Mexico." Trans. Amer. Phil. Soc., (N.S.) XXX, pp. i–viii, 1–510. (*Ectoconus*, pp. 126–144.)

[2] But he apparently left many of Cope's identifications as *E. ditrigonus* without any detailed reëxamination; these are in the "Unknown level" column.

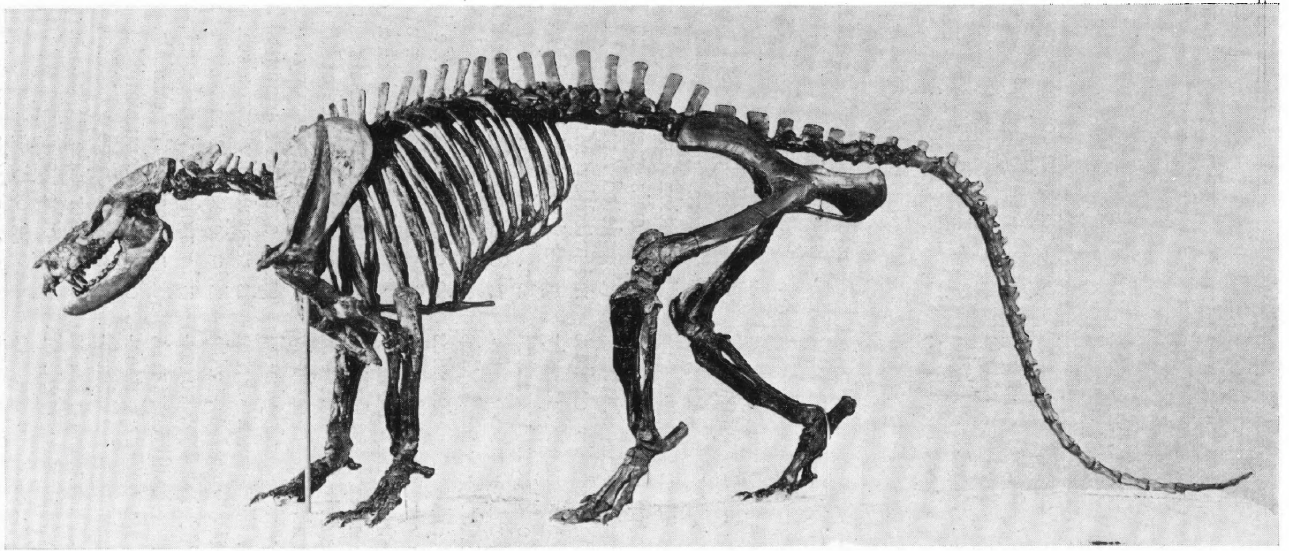

Fig. 1. *Ectoconus majusculus* Matthew, 1937. Amer. Mus. No. 16500, skeleton. Left lateral view. About 1/8 of natural size, in plane of vertebrae.

son of the present photographs with those published by Matthew will show that much of the dorsoventral flattening of the anterior half of the skull was corrected but that the cranium is still smaller in this dimension than it was in the living animal. As far as possible these and other lesser imperfections due to crushing have been discounted in the life restorations.

The right elbow joint was severely damaged or diseased in life and, although it remained imperfectly functional, this must have made the animal very lame. This interesting pathology has, of course, been retained in the mount but has been omitted from the life restorations. The vertebral formula is uncertain and has been made cer.7, d.14, l.6, s.4, cau.24. Cervical and sacral counts are certain. Matthew suggested that some dorsals may be missing between the 12th and 13th as preserved, but with allowance for crushing the sequence of 14, as found, seems to us to be continuous and complete. On the other hand Matthew thought that the 4 lumbars preserved might have formed the complete series, but on mounting there seemed to be a break between the 2d and 3d and we have inserted two plaster lumbars making 6 in all, which may not have been the exact number. The true number of caudals is unknown but the tail must have been long and heavy, about as restored.

Ectoconus was one of the largest mammals of its epoch although small in comparison with most living ungulates. The skeleton as mounted measures about $5^1/_2$ feet along the curve of the back from nose to tail, inclusive, and about 3 feet in a straight line from tip of nose to posterior margin of ischium. The upper margin of the scapula is $16^3/_4$ inches from the ground, so that the living animal was about $1^1/_2$ feet high at the shoulder.

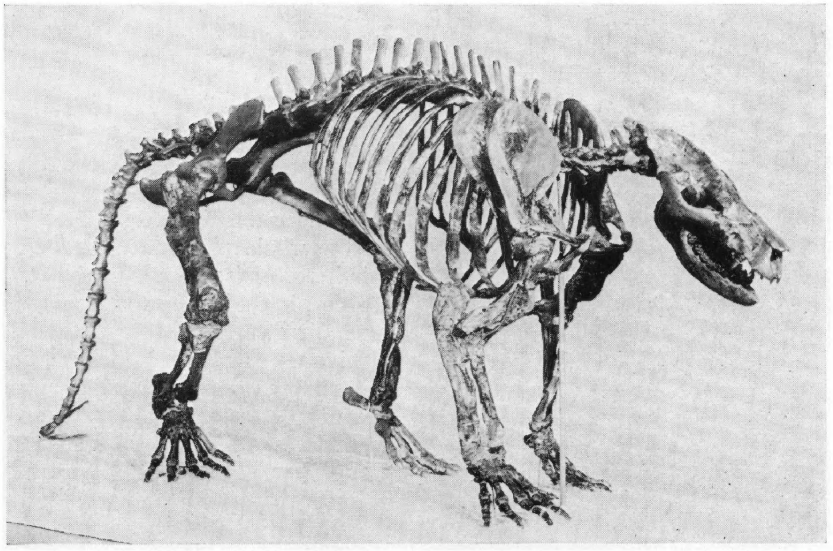

Fig. 2. *Ectoconus majusculus.* Same as Fig. 1. Right anterior oblique view. About $^1/_8$ of natural size, on right fore limb.

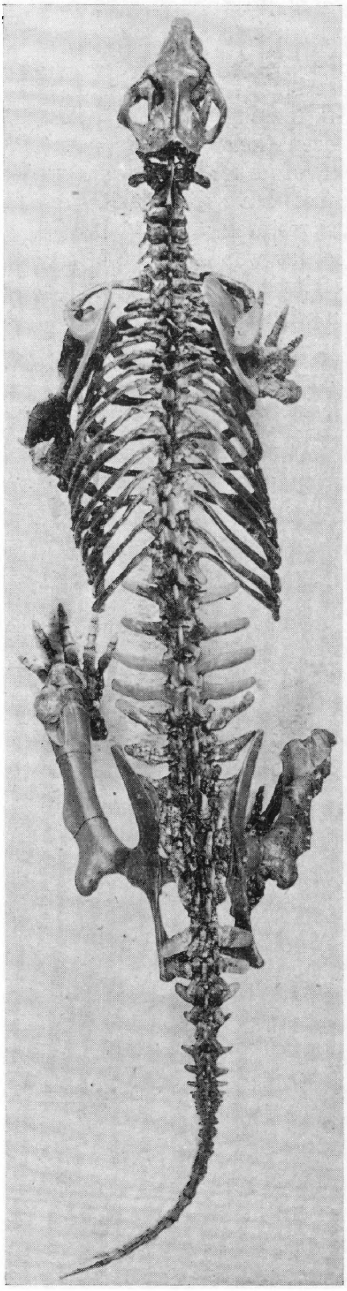

Fig. 3. *Ectononus majusculus*. Same as Fig. 1. Dorsal view. About 1/8 of natural size, in overall length.

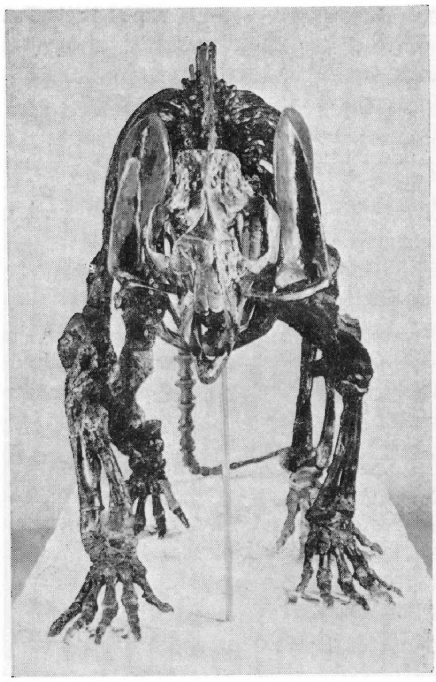

Fig. 4. *Ectoconus majusculus*. Same as Fig. 1. Anterior view. About 1/8 of natural size, on zygomatic arches.

The polybunodont cheek teeth and the rather robust limbs must be taken as slight specializations on a low level, but on the whole *Ectoconus* is extraordinarily primitive. Discounting these minor peculiarities, it could serve as a diagram of a generalized, ancestral ungulate or, indeed, carnivore—as Matthew pointed out, some of the most primitive and early carnivores and ungulates are so much alike that it is hard to draw a sharp line between these great groups, later so widely divergent. This similarity is very striking in the lateral views of the *Ectoconus* skeleton, which could pass for a carnivore at first sight. There is, nevertheless, no doubt that *Ectoconus* is somewhat closer to the ungulate ancestry and represents a branch derived from (and by me referred to) the Condylarthra, most primitive of ungulate orders. Matthew likewise pointed out the remarkable resemblance of the skeleton of *Ectoconus* to that of the living aard-vark, aside from some mani-

festly adaptive specialization of the latter. A fossil *Orycteropus*, nearly like the living form, has recently been mounted in our laboratory and we were all struck by the similarity of *Ectoconus* as its skeleton was assembled immediately after that of *Orycteropus*.

Despite this structural resemblance, *Orycteropus* was not taken as a guide for the life restoration of *Ectoconus*. The skeletal differences that do exist are just those that would be most striking in a restoration and it seems unlikely that *Ectoconus* had acquired such characters, not deducible from the skeleton, as the enlarged external ears and reduced pelage of the aard-vark. In the restoration of *Ectoconus* Mr. Germann has faithfully followed all the indications of the mounted skeleton and has been as non-committal as possible regarding most characters unrelated to the skeleton, showing a short, uniform pelage, generalized ears, and a snout with characters common to omnivorous animals of most nearly similar habitus. The stripes are an exception to this conservative stand and are, of course, entirely hypothetical,[1] but they help the modeling of the body and improve the artistic effect, without being contrary to possibility or susceptible to correction one way or the other.

(See figures 5 and 6 on following pages.)

[1] The argument that primitive mammals must have been striped like the young of a few modern species does not seem to me to have any great value for strictly scientific deduction.

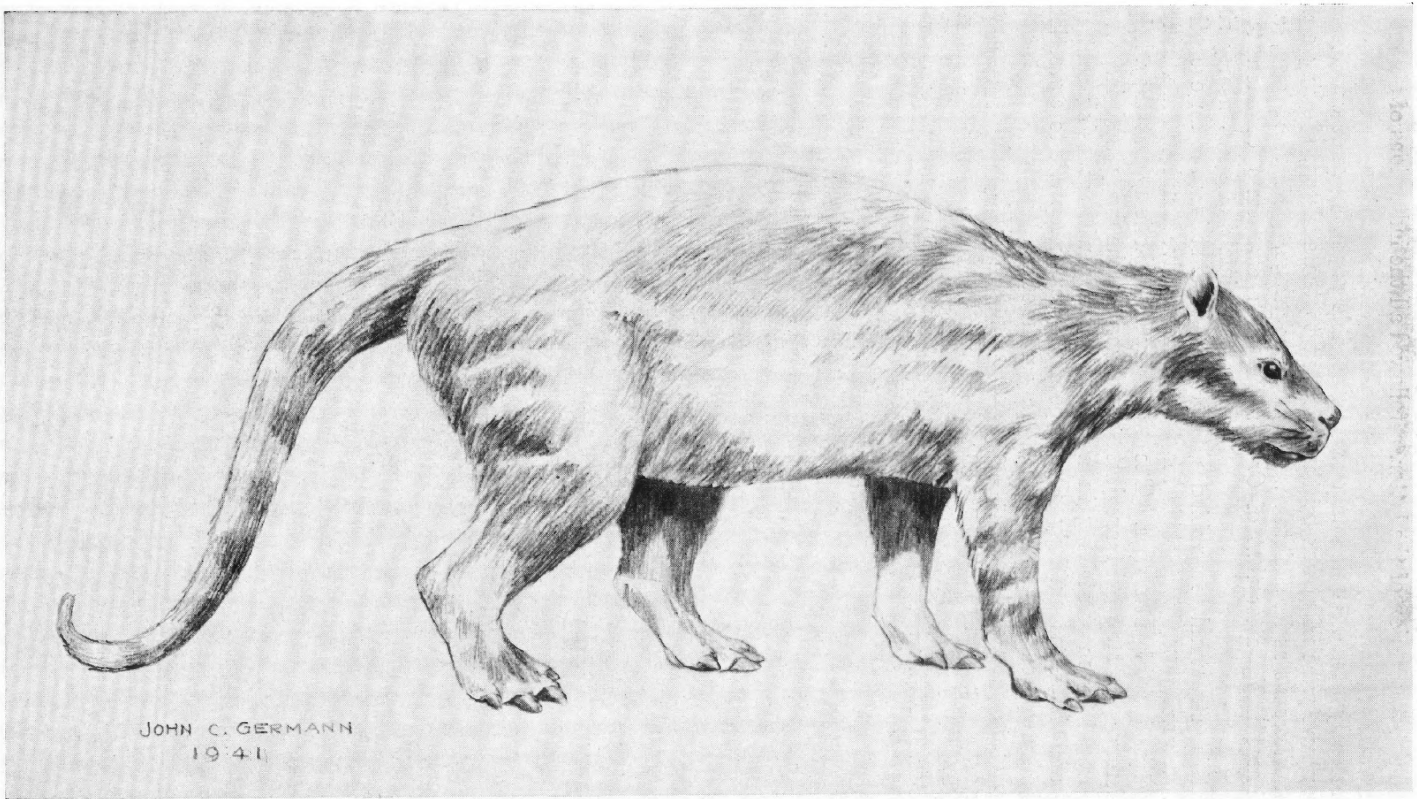

Fig. 5. *Ectoconus majusculus.* Individual life restoration by J. C. Germann. 1/8 natural size.

Fig. 6. *Ectoconus majusculus*. Habitat restoration by J. C. Germann. The trees most definitely indicated are similar to cabbage palms, desert palms, tanbark oaks, and sassafras, allies of which have been found in beds of approximately this age. The turtle is a trionychid, not a scaled restoration of a particular species or specimen but representing *Aspideretes*, a common genus found in direct association with *Ectoconus*.